Space Weather Forecast

Issued on Sunday, 02 June 2024 at 00:17 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate to High solar activity with further Moderate or Strong flares likely. Coronal Mass Ejections from late 01 June currently awaiting analysis.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High with two Strong flares observed at 01/0848 UTC and 01/1836 UTC, both from the active sunspot region on the southeast disc. Despite being much reduced in size from its previous incarnation on the last rotation, this remains a moderately sized region with slight increase in overall area observed during the period. It is a complex region with opposite magnetic polarities observed within the same spot in both leading and trailing portions of the group. This is one of nine numbered regions on the visible disc. A previously notable region in the northwest disc continued to simplify, breaking into smaller component spots. Of the remaining groups on the disc, some modest growth was observed in two regions in the northwest, meanwhile two new areas, located in the southwest and southeast emerged as maturing groups with fairly simple magnetic structures.

A Strong flare at 01/1836 UTC from the moderately sized sunspot region in the southeast disc was followed by a sympathetic, long duration Moderate flare from the same region, peaking at 01/1940 UTC. Both flares appear to have resulted in Coronal Mass Ejections (CMEs), with solar imagery still backfilling at the time of writing. A 'full-halo' CME was observed from Earth's frame of reference from the first flare, with the second flare resulting in a 'partial halo' CME, apparently more displaced towards the east. As more imagery becomes available these features will be analysed and modelled for input into forthcoming forecasts. Additionally there are a number of filaments (arc of the Sun's plasma) on the disc, including two large areas across the southern hemisphere that will be monitored for any potential lift-offs.

Solar Wind / Geomagnetic Activity: Solar winds persisting at background levels, varying between 320-360 km/s. Interplanetary Magnetic Field strength was generally weak with the north-south component also varying weakly. Geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background levels with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: High to Moderate activity is forecast with further occasional Moderate class or Strong class flares expected, mainly from the complex sunspot in the southeast.

Solar Wind / Geomagnetic Activity: A weak CME from a common class flare off the northeast disc on 31 May is expected either late day 1 or early day 2 (02-03 Jun), although confidence is low with the strength of any arrival due to the faint and weak nature of the CME. Analysis of the double CME event late on 01 Jun is still pending. Otherwise background winds are likely to persist, with a chance of becoming slightly enhanced for a time between days 1 and 2 (02-03 Jun) with any onset of the fast wind from a small coronal hole, however this is also low

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confidence.

Geomagnetic activity is forecast to be mainly Quiet, but increasing to Unsettled to Active with any fast wind onset day 1 (02 Jun) or CME arrival day 1-2 (02-03 Jun). These bring a slight chance of G1 Minor Storm intervals, and a very slight risk is maintained on days 3 and 4 (04-05 Jun), given the recent activity on the disc and the potential for further CMEs. Please note that the forecast for days 3 and 4 (04 and 05 Jun) does not currently include the pending analysis of the double CME event from late 01 Jun. As such probabilities for these days are likely to be updated in the next bulletin.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to persist at background levels, but with a slight chance of rising above the S1 Minor Storm level in response to any further notable flares.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	20	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	75	70	60
Very Active	R3 to R5 X	Yes	40	40	30	25

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	20	20
Very Active	≥ S3 *	No	5	5	5	5

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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